Epicardium-derived progenitor cells require beta-catenin for coronary artery formation.

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Public Summary:

Scientific Abstract:
We have previously identified several members of the Wnt/beta-catenin pathway that are differentially expressed in a mouse model with deficient coronary vessel formation. Systemic ablation of beta-catenin expression affects mouse development at gastrulation with failure of both mesoderm development and axis formation. To circumvent this early embryonic lethality and study the specific role of beta-catenin in coronary arteriogenesis, we have generated conditional beta-catenin-deletion mutant animals in the proepicardium by interbreeding with a Cre-expressing mouse that targets coronary progenitor cells in the proepicardium and its derivatives. Ablation of beta-catenin in the proepicardium results in lethality between embryonic day 15 and birth. Mutant mice display impaired coronary artery formation, whereas the venous system and microvasculature are normal. Analysis of proepicardial beta-catenin mutant cells in the context of an epicardial tracer mouse reveals that the formation of the proepicardium, the migration of proepicardial cells to the heart, and the formation of the primitive epicardium are unaffected. However, subsequent processes of epicardial development are dramatically impaired in epicardial-beta-catenin mutant mice, including failed expansion of the subepicardial space, blunted invasion of the myocardium, and impaired differentiation of epicardium-derived mesenchymal cells into coronary smooth muscle cells. Our data demonstrate a functional role of the epicardial beta-catenin pathway in coronary arteriogenesis.

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